AI Planning
Exercise Sheet 8

Date: December 14, 2014
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Exercise 8.1

Exercise 8.2

Notes:

- $\Pi = \langle V, I, O, \gamma \rangle$ (in FDR) is SAS$^+$ iff
  - $\forall o \in O$ have no conditional effects
  - $\forall \chi$ of $o \in O$ and γ are conjunctions of atoms

- $\mathscr{T}(\Pi) = \langle S, L, T, s_0, S_\star \rangle$ is the induced transition system of $\Pi = \langle V, I, O, \gamma \rangle$ where
  - S is the set of states over V
  - $L = O$
  - $T = \{\langle s, o, t \rangle \in S \times L \times S | app_o(s) = t\}$
  - $s_0 = I$
  - $S_\star = \{s \in S | s \models \gamma\}$

- $P \subseteq V$ is a pattern, $\Pi|_P$ denotes Π restricted to the variables in P
- π_P is the projection $S \to S'$ for P, $\mathscr{T}^{\pi_P}$ denotes the transition system induced by π_P
- two transition systems $\mathscr{T}$ and $\mathscr{T}'$ are graph-equivalent ($\mathscr{T} \overset{G}{\sim} \mathscr{T}'$) if there exists a bijective function $\phi : S \to S'$ such that
  - $\phi(s_0) = s'_0$
  - $s \in S_\star$ iff $\phi(s) \in S'_\star$
  - $\langle s, \ell, t \rangle \in T$ for *some* $\ell \in L$ iff $\langle \phi(s), \ell', \phi(t) \rangle \in T'$ for *some* $\ell' \in L'$

(a) to show: $\mathscr{T}(\Pi|_P) \overset{G}{\sim} \mathscr{T}(\Pi)^{\pi_P}$ if Π
- is an SAS$^+$ planning task
- is not trivially unsolvable
- has no trivially inapplicable operators

(b)